Set 5

---

1. What is 35 percent of the sum of 1.4 and $\frac{1}{5}$?

A. 0.42
B. 0.56
C. 0.85
D. 1.55
E. 1.95

---

2. A certain characteristic in a large population has a distribution that is symmetric about the mean m. If 68 percent of the distribution lies within one standard deviation d of the mean, what percent of the distribution is less than m +d ?

A. 16%
B. 32%
C. 48%
D. 84%
E. 92%

---

3. If the units digit of the three-digit positive integer k is nonzero, what is the tens digit of k?

(1) The tens digit of k + 9 is 3.

(2) The tens digit of k + 4 is 2.

---

4. If the average (arithmetic mean) of positive integers x, y, and z is 10, what is the greatest possible value of z ?

A. 8
B. 10
C. 20
D. 28
E. 30

5. A department manager distributed a number of pens, pencils, and pads among the staff in the department, with each staff member receiving x pens, y pencils, and z pads. How many staff members were in the department?

(1) The numbers of pens, pencils, and pads that each staff member received were in the ratio 2 : 3 : 4, respectively.

(2) The manager distributed a total of 18 pens, 27 pencils, and 36 pads.

---

6. In the sequence 1, 2, 4, 8, 16, 32, …, each term after the first is twice the previous term. What is the sum of the 16th, 17th, and 18th terms in the sequence ?

A. 2^{18}
B. $3(2^{17})$
C. $7(2^{16})$
D. $3(2^{16})$
E. $7(2^{15})$

---

7. If each of the 8 employees working on a certain project received an award, was the amount of each award the same?

(1) The standard deviation of the amounts of the 8 awards was 0.

(2) The total amount of the 8 awards was $10,000.

---

8. A cash register in a certain clothing store is the same distance from two dressing rooms in the store. If the distance between the two dressing rooms is 16 feet, which of the following could be the distance between the cash register and either dressing room?

I. 6 feet
II. 12 feet
III. 24 feet

A. I only
B. II only
C. III only
D. I and II
E. II and III

9. What is the value of $a^{-2b}b^{-3}$?

(1) $a^{-3}b^{-2} = 36^{-1}$

(2) $ab^{-1} = 6^{-1}$

----

10. If $x^2 - 2 < 0$, which of the following specifies all the possible values of x ?

A. $0 < x < 2$
B. $0 < x < \sqrt{2}$
C. $-\sqrt{2} < x < \sqrt{2}$
D. $-2 < x < 0$
E. $-2 < x < 2$

----

11. At the end of each year, the value of a certain antique watch is c percent more than its value one year earlier, where c has the same value each year. If the value of the watch was k dollars on January1, 1992, and m dollars on January 1, 1994, then in terms of m and k, what was the value of the watch, in dollars, on January 1, 1995?

A. $m + \frac{1}{2}(m - k)$
B. $m + \frac{1}{2}\left(\frac{m-k}{k}\right)m$
C. $\frac{m\sqrt{m}}{\sqrt{k}}$
D. $\frac{m^2}{2k}$
E. km^2

----

12. If $x > 0.9$, which of the following could be the value of x ?

A. $\sqrt{0.81}$
B. $\sqrt{0.9}$
C. $(0.9)^2$
D. $(0.9)(0.99)$
E. $1-\sqrt{0.01}$

13. Of the books standing in a row on a shelf, an atlas is the 30_{th} book from the left and the 33_{rd} book from the right. If 2 books to the left of the atlas and 4 books to the right of the atlas are removed from the shelf, how many books will be left on the shelf?

A. 56
B. 57
C. 58
D. 61
E. 63

---

14. Some computers at a certain company are Brand X and the rest are Brand Y. If the ratio of the number of Brand Y computers to the number of Brand X computers at the company is 5 to 6, how many of the computers are Brand Y ?

(1) There are 80 more brand X computers than brand Y computers at the company.

(2) There is a total of 880 computers at the company.

---

15. If $R = \frac{P}{Q}$ is R = P?

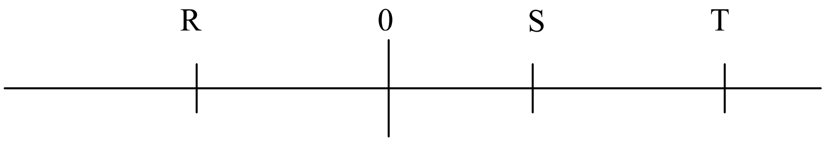
(1) $P > 50$

(2) $Q = 20$

---

16. $4^3 + 4^3 + 4^3 + 4^3 =$

A. 4^4
B. 4^6
C. 4^8
D. 4^9
E. 4^{12}



17. The number line shown contains three points R, S, and T, whose coordinates have absolute values r, s, and t, respectively. Which of the following equals the average (arithmetic mean) of the coordinates of the points R, S, and T?

A. s

B. s + t -r

C. $\frac{r-s-t}{3}$

D. $\frac{r+s+t}{3}$

E $\frac{s+t-r}{3}$

---

18. Departments A, B, and C have 10 employees each, and department D has 20 employees. Departments A, B, C, and D have no employees in common. A task force is to be formed by selecting 1 employee from each of departments A, B, and C and 2 employees from department D. How many different task forces are possible?

A. 19,000

B. 40,000

C. 100,000

D. 190,000

E. 400,000

---

19. If the product of the digits of the two-digit positive integer n is 2, what is the value of n?

(1) n is odd.

(2) n is greater than 20.

20. If the sum of three integers is even, is the product of the three integers a multiple of 4?

(1) All three integers are equal.

(2) All three integers are even.

---

21. Martin has worked for the last 30 years. If his average (arithmetic mean) total annual earnings for the first 5 years is $15,000, what is his average total annual earnings for the last 5 years?

(1) Martin’s average total annual earnings for the first 25 years is $27,000.

(2) Martin’s average total annual earnings for the last 25 years is $34,000.

---

22. How many 4-digit positive integers are there in which all 4 digits are even?

A. 625
B. 600
C. 500
D. 400
E. 256

---

23. If x = 0 and x = $\sqrt{8xy-16y^2}$, then, in terms of y, x =

A. – 4y

B. $\frac{y}{4}$

C. y

D. 4y

E. $4y^2$

Factor	Percent of Respondents
User-friendly	56%
Fast response time	48%
Bargain prices	42%

24. The table above gives three factors to be considered when choosing an Internet service provider and the percent of the 1,200 respondents to a survey who cited that factor as important. If 30 percent of the respondents cited both "user-friendly" and "fast response time," what is the maximum possible number of respondents who cited "bargain prices," but neither "user-friendly" nor "fast response time?"

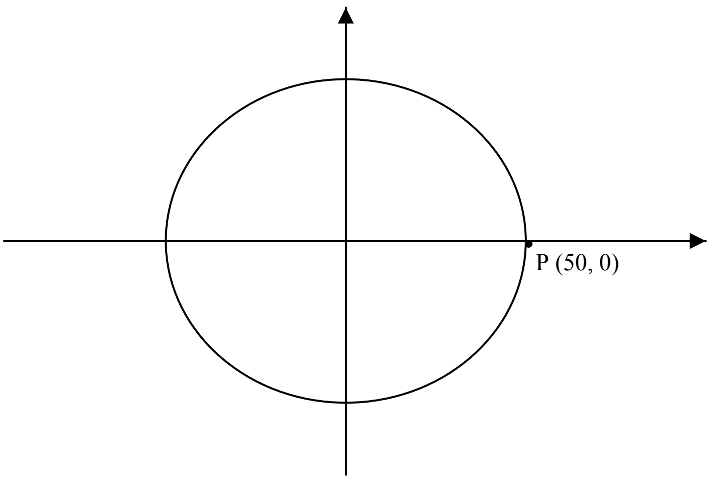
A. 312
B. 336
C. 360
D. 384
E. 420

---

25. Is $|k| = 2$?

(1) $k^2 = 4$

(2) $k = |-2|$



26. In the figure shown above, the circle has center O at the origin, and radius 50. Point P has coordinates (50, 0). If point Q (not shown) is on the circle, what is the length of line segment PQ ?

(1) The x-coordinate of point Q is – 30.

(2) The y-coordinate of point Q is – 40.

27. The function f is defined by $f(x) = -\frac{1}{x}$ for all nonzero numbers x. If $f(a) = -\frac{1}{2}$ and $f(ab) = \frac{1}{6}$, then b=?

A. 3

B. $\frac{1}{3}$

C. $-\frac{1}{3}$

D. -3

E. -12

---

28. A school administrator will assign each of the n students to one of m classrooms. If 3<m<13<n, is it possible to assign each of the n students to one of the m classrooms so that each classroom has the same number of students assigned to it?

(1) It is possible to assign each of 3n students to one of m classrooms so that each classroom has the same number of students assigned to it.

(2) It is possible to assign each of 13n students to one of m classrooms so that each classroom has the same number of students assigned to it.

---

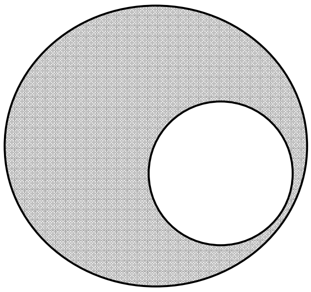
29. The toll for crossing a certain bridge is $0.75 each crossing. Drivers who frequently use the bridge may instead purchase a sticker each month for $13.00 and then pay only $0.30 each crossing during that month. If a particular driver will cross the bridge twice on each of x days next month and will not cross the bridge on any other day, what is the least value of x for which this driver can save money by using the sticker?

A. 14
B. 15
C. 16
D. 28
E. 29

30. Robots X, Y, and Z each assemble components at their respective constant rates. If r_x is the ratio of robot X's constant rate to robot Z's constant rate and r_y is the ratio of robot Y's constant rate to robot Z's constant rate, is robot Z's constant rate the greatest of the three?

(1) $r_x < r_y$

(2) $r_y < 1$



31. In the figure shown, if the area of the shaded region is 3 times the area of the smaller circular region, then the circumference of the larger circle is how many times the circumference of the smaller circle?

A. 4
B. 3
C. 2
D. $\sqrt{3}$
E. $\sqrt{2}$

---

32. If n is an integer between 10 and 99, is n < 80?

(1) The sum of the two digits of n is a prime number.

(2) Each of the two digits of n is a prime number.

---

33. Of the families in City X in 1994, 40 percent owned a personal computer. The number of families in City X owning a computer in 1998 was 30 percent greater than it was in 1994, and the total number of families in City X was 4 percent greater in 1998 than it was in 1994. What percent of the families in City X owned a personal computer in 1998?

A. 50% B. 52% C. 56% D. 70% E. 74%

34. If a rectangular room measures 10 meters by 6 meters by 4 meters, what is the volume of the room in cubic centimeters? (1 meter = 100 centimeters)

A. 24,000
B. 240,000
C. 2,400,000
D. 24,000,000
E. 240,000,000

---

35. For what percent of those tested for a certain infection was the test accurate; that is, positive for those who had the infection and negative for those who did not have the infection?

(1) Of those who tested positive for the infection, $\frac{1}{8}$ did not have the infection.

(2) Of those tested for the infection, 90 percent tested negative.

---

36. What is the value of $\frac{|x|}{x}$?

(1) x>0

(2) x = 5

---

37. Which of the following fractions has the greatest value?

A. $\frac{1}{(3^2)(5^2)}$

B. $\frac{2}{(3^2)(5^2)}$

C. $\frac{7}{(3^3)(5^2)}$

D. $\frac{45}{(3^3)(5^3)}$

E. $\frac{75}{(3^4)(5^5)}$

Answers for set 5

1. The best answer is B.

We have to calculate $0.35(1.4+\frac{1}{5}) = 0.35\ (1.4+0.2) = 0.35*1.6=0.56$

2. The best answer is D.

There are 68% within one standard deviation from the mean➔ there are $\frac{68\%}{2} = 34\%$ that are above the mean and within one standard deviation from the mean (symmetric distribution). There are 50% above the mean (symmetric distribution) ➔ there are 50-34= 16% above m+d➔ there are 100-16=84% below m+d.

3. The best answer is A.

Let u be the units digit of k.

It is given that u is at least 1.

(1) Sufficient. Since u is at least 1, u+9>10 ➔ The tens digit of k+9 is 3 means that the tens digit of k is 2.

(2) Insufficient. If u<6 then u+4<10 ➔ The tens digit of k+4 is 2 means that the tens digit of k is also 2. For example, k=125, k+4=129. On the other hand, if u>6, then u+4>10 ➔ The tens digit of k+4 is 2 means that the tens digit of k is 1. For example, k=118, k+4=122.

4. The best answer is D.

$10=\frac{x+y+z}{3} \Rightarrow x+y+z=30$. It is given that x and y are positive integers ➔ their least possible value is 1 ➔ the greatest possible value of z is 30-1-1=28

5. The best answer is E.

Let n be the number of staff members. We have to find n.

(1) Insufficient. Let 2a be the number of pens each member got ➔ x=2a➔ y=3a, z=4a ➔ The total number of writing materials each member got is 9a. Together, they all got 9*a*n writing materials, but n can have any value.

(2) Insufficient. It is given that n(x+y+z) = 81 (n,x,y,z are integers) ➔ n can be any number by which 81 is divisible (except for 81)➔ n can be 3,9 or 27.

(1)+(2) Insufficient. Combining, the equation is: 9*a*n=81 ➔ a*n=9 (a and n are integers) ➔ n can be 1,3 or 9.

6. The best answer is E.

$A_1=2^0$, $a_2=2^1$, $a_3=2^2$, $a_4=2^3$… ➔ $a_n = 2^{n-1}$ ➔ $a_{16}=2^{15}$, $a_{17}=2^{16}=2*2^{15}$, $a_{18}=2^{17}= 2*2*2^{15}$
➔ $a_{16}+a_{17}+a_{18} = 2^{15}(1+2+4)=7(2^{15})$

7. The best answer is A.

(1) Sufficient. The standard deviation is o means that each employee got exactly the same amount.

(2) Insufficient. $10,000 can be divided in many different ways between the 8 employees.

8. The best answer is E.

Let R be the cash register, and let D_1 and D_2 be the two dressing rooms. So R, $D_1$and D_2 are actually 3 vertices of an isosceles triangle ➔ the sum of any 2 sides in the triangle must be bigger than the third side of the triangle.

It is given that the distance between D_1 and D_2 is 16 ➔ $D_1D_2=16$

I. $RD_1=RD_2=6$. ➔ $RD_1+RD_2=12 < 16 = D_1D_2$ ➔ impossible.

II. $RD_1=RD_2=12$ ➔ $RD_1+RD_2=24>16 = D_1D_2$. In addition, $RD_1+D_1D_2=12+16>12$. Similarly, $RD_2+D_1D_2 > RD_1$ ➔ possible.

III. $RD_1=RD_2=24$. If we do exactly what we did in II, we will see that it's possible.

9. The best answer is C.

(1) Insufficient. $\frac{1}{a^3b^2} = \frac{1}{36} \Rightarrow a^3b^2 = 36$. Since a and b are not necessarily integers, a and b can have many values➔ $a^{-2b}b^{-3}$ can have many values.

(2) Insufficient. $\frac{a}{b} = \frac{1}{6}$ ➔ a and b can have many values➔ $a^{-2b}b^{-3}$ can have many values.

(1)+(2) Sufficient. From (2), b=6a , so using (1) we receive: $a^3(6a)^2=36$ ➔

$36a^3a^2=36$ ➔ $a^5=1$ ➔ a=1➔ b=6. ➔ $a^{-2b}b^{-3}=\frac{1}{6^3}$.

10. The best answer is C.

$x^2 - 2 < 0$ ➔ $x^2 < 2$ ➔ $-\sqrt{2} < x < \sqrt{2}$

11. The best answer is C.

Suppose that k=200 and c=50% ➔ In January 1993 the value of the watch is 300 ➔ In January 1994 the value of the watch is 450 ➔ In January 1995 the value is 675. Now we will plug in the answers k=200, m=450, and we will see which expression will give us 675.

A. $m+\frac{1}{2}(m-k) = 450 + \frac{1}{2}*250 = 575 \neq 675$

B. $m+\frac{1}{2}\left(\frac{m-k}{k}\right)m = 450+ \frac{1}{2}*\frac{250}{200}*450$ which is not even in integer.

C. $\frac{m\sqrt{m}}{\sqrt{k}} = \frac{450*\sqrt{450}}{\sqrt{200}} = 450*\sqrt{\frac{450}{200}} = 450*\sqrt{\frac{9}{4}} = 450*\frac{3}{2} = 675$

D. $\frac{m^2}{2k} = \frac{450^2}{2*200}$ which is not even an integer.

E. Km2= 200*4502 > 675

12. The best answer is B.

A. $\sqrt{0.81}=\sqrt{\frac{81}{100}}=\frac{\sqrt{81}}{\sqrt{100}}=\frac{9}{10}=0.9$.

B. $\sqrt{0.9}>0.9$ ➔ $\sqrt{0.9}$ is a possible value for x

C. $0.9^2<0.9$

D. $(0.9)(0.99) < 0.9$

E. $1-\sqrt{0.01}=1-\sqrt{\frac{1}{100}}=1-\frac{1}{10}=\frac{9}{10}=0.9$

13. The best answer is A.

The number of books before the removal = (The number of books from the left of the atlas)+(The number of books from the right of the atlas)+1 (1 is for the atlas itself). = 29+32+1=62. The number of books removed is 2+4=6 ➔ after the removal: 62-6=56.

14. The best answer is D.

Let X and Y be the number of computers Brand X and Brand Y respectively.

It is given that $\frac{Y}{X}=\frac{5}{6}$ .We are looking for Y.

(1) Sufficient. $\frac{Y}{X}=\frac{5}{6}$ and X=80+Y ➔ $\frac{Y}{80+Y}=\frac{5}{6}\Rightarrow Y=400$

(2) Sufficient. $\frac{Y}{X}=\frac{5}{6}$ and X+Y=880 ➔ X=880-Y➔ $\frac{Y}{880-Y}=\frac{5}{6}\Rightarrow Y=400$

15. The best answer is C.

R=$\frac{P}{Q}\Rightarrow P=RQ$ ➔ There are 2 possibilities to get R=P: (1) Q=1 (2) P=R=0

(1) Insufficient. If P>50, the second possibility can't happen, but the first can. So if Q=1 then R=P, and if $Q\neq 1$ then $R\neq P$.

(2) Insufficient. If Q=20 then $Q\neq 1$, so the first possibility can't happen, but the second can. So if P=R=0 then P=R and if $P\neq 0$ or $R\neq 0$ then $P\neq R$.

(1)+(2) Sufficient. Combining (1) and (2) neither one of the two possibilities can happen ➔ $P\neq R$

16. The best answer is A.

$4^3 + 4^3 + 4^3 + 4^3 = 4*4^3=4^4$

17. The best answer is E.

S=s, T=t, R= -r ➔ the average = $\frac{s+t-r}{3}$

18. The best answer is D.

The number of possibilities to choose one employee from each of the Departments A, B and C is $10\left(\frac{10!}{1!9!}\right)$. The number of possibilities to choose 2 employees from Departments D is $\frac{20!}{2!18!} = \frac{19*20}{2} = 190$ ➔ 10*10*10*190=190,000

19. The best answer is D.

There are only 2 possibilities: a=1, b=2 or a=2, b=1 ➔ n=12 or n=21.

(1) Sufficient. If n is odd, n must be 21.
(2) Sufficient. If n is greater than 20, n must be 21.

20. The best answer is D.

(1) Sufficient. If the three integers are equal, they must be even since the sum of 3 odd integers is odd. So we have a product of 3 even integers, since each of the integers is divisible by 2, their product is divisible by 4 (and also by 8).
(2) Sufficient, for the same reason as in (1).

21. The best answer is C.

(1) Insufficient. There is no information about the last 5 years at all.

(2) Insufficient. We know the average of the 30 years, but there is no way to know the average of the last 5 years.

(1)+(2) Sufficient. Using statement 2 and the data in the question, we know his total earnings ($15,000*5 + $34,000*25). We can deduct his earnings in the first 25 years ($27,000*25) and we are left with his earnings in the last five years $\left(\frac{250{,}000}{5}5{,}000\right)$

22. The best answer is C.

The number of possibilities for the thousands digit is 4 (2, 4, 6 and 8). The number of possibilities for each of the other 3 digits is 5 (0, 2, 4, 6 and 8) ➔ 4*5*5*5=500.

23. The best answer is D.

x = $\sqrt{8xy-16y^2}$ ➔ x^2=8xy-16y^2 ➔ x^2-8xy+16y^2=0 ➔ $(x-4y)^2=0$ ➔ x = 4y

24. The best answer is A.

The percent of responders who mentioned at least one of the 2 factors, "User-friendly" or "Fast response time" is: 56+48-30= 74% ➔ The percent of responders who mentioned neither "user-friendly" nor "fast response time" is 100-74=26%. We know that 42% mentioned "bargain prices" ➔ The maximum possible PERCENT of respondents who cited “bargain prices,” but neither “user-friendly” nor “fast response time" is 26% ➔ The maximum possible number of these responders is

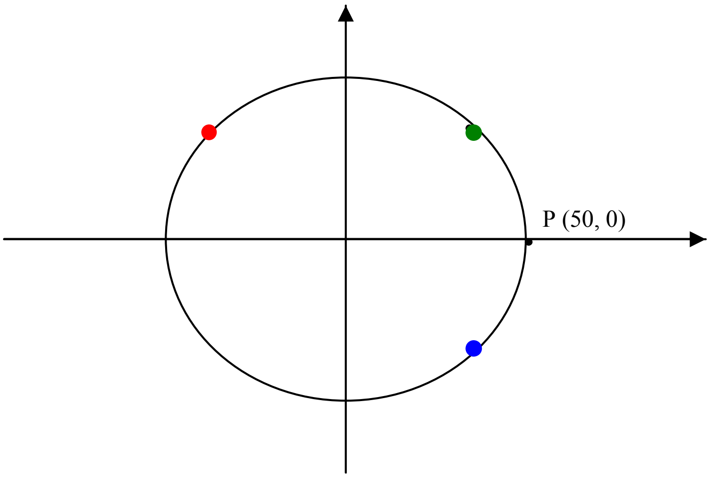
$\frac{26}{100}*1{,}200=312$

25. The best answer is D.

(1) Sufficient. k^2=4 ➔ k=2 or k=-2. In both cases, $|k|=2$

(2) Sufficient. k=$|-2|$ ➔ k=2

26. The best answer is A.



(1) Sufficient. There are two possibilities for Q (The blue and the green), which are equidistant from P.

(2) Insufficient. There are two possibilities for Q (The red and the green), which are not equidistant from P.

27. The best answer is D.

By definition, f(a) = $-\frac{1}{a}$. We know that f(a) $= -\frac{1}{2}$ ➔ $-\frac{1}{a} = -\frac{1}{2}$ ➔ a = 2. By definition, f (ab) $= \frac{-1}{ab}$. We know that f(ab) = $\frac{1}{6}$ ➔ $\frac{-1}{ab} = \frac{1}{6}$. Since a = 2, ➔ $\frac{-1}{2b} = \frac{1}{6}$ ➔ b = -3.

28. The best answer is B.

In order to assign each of the n students to one of the m classes so that each classroom has the same number of students, n should be divisible by m without a remainder.

(1) Insufficient. We can not determine that n is divisible by m. E.g. m=6 and n=60 ➔ n is divisible by m, or m=6, n=20 then 3n is divisible by n but n is not divisible by m.

(2) Sufficient. It is given that 13n is divisible by m. Since 13 is a prime number and m<13, we can infer that 13 is not divisible by m ➔ n is divisible by m.

29. The best answer is B.

The number of times the driver will cross the bridge is 2x. ➔ If he doesn't buy the ticket, he will pay 0.75*2x=1.5x. If he buys the ticket, he will pay $0.3 dollars for each crossing plus the sticker price ➔ 0.3*2x+13=0.6x+13. We should find the least value of x for which this driver can save money by using the sticker➔ We are looking for the least x which satisfies the following inequality: 0.6x+13<1.5x ➔ $x>14\frac{4}{9}$ ➔ The least x is 15.

30. The best answer is C.

Let X, Y and Z be the constant rates of Robots X, Y and Z respectively. It is given that $\frac{X}{Z}=r_x$ and $\frac{Y}{Z}=r_y$.

(1) Insufficient. We can conclude that Y>X.

(2) Insufficient. $r_y<1$ ➔ Z>Y, but we don't know whether Z>X.

(1)+(2) Sufficient. Using both statements we know that Y<Z and X<Y➔ Z>Y>X

31. The best answer is C.

Let a be the area of the smaller circle ➔ 3a is area of the shaded region. ➔ The area of the larger circle is 4a. The area of the small circle is $\pi r^2=a$ and the area of the large circle is $\pi R^2=4a$ ➔ $\frac{\pi R^2}{4}=a$. Using the two equations $\pi r^2=\frac{\pi R^2}{4}$ ➔ R=2r.

The ratio of the circumferences is $\frac{2\pi(2r)}{2\pi r}=2$.

32. The best answer is B.

It is given that 10<n<99.

(1) Insufficient. E.g. n=12 or n=83

(2) Sufficient. n must be smaller than 80, otherwise the tens digit of n is either 8 or 9, which are not prime numbers.

33. The best answer is A.

Assume the total number of families in 1994 is 100 ➔ 40 families have a personal computer in 1994 ➔ The number of families with a personal computer in 1998 is $\frac{130}{100}*40=52$ and the total number of families in 1998 is 104 ➔ the percent of the families owned a personal computer in 1998 = $\frac{52}{104}*100=50\%$

34. The best answer is E.

The measures of the rectangular room in centimeters are 10*100 centimeters by 6*100 centimeters by 4*100 centimeters ➔ the volume of the room in cubic centimeters is 1,000*600*400 = 240,000,000

35. The best answer is E.

(1) Insufficient. We don't have any information about those who tested negative.

(2) Insufficient. We have no information about the true condition of those who tested positive and for those tested negative.

(1)+(2) Insufficient. We still don't have any information about the true condition of those tested negative.

36. The best answer is D.

(1) Sufficient. If x>0 then $|x|=x$ ➔ $\frac{|x|}{x}=\frac{x}{x}=1$

(2) Sufficient. x=5 ➔ $\frac{|x|}{x}=\frac{|5|}{5}=\frac{5}{5}=1$

37. The best answer is D.

Compare A and B: $\frac{2}{(3^2)(5^2)} > \frac{1}{(3^2)(5^2)}$ ➔ A is not the answer. Compare B and C: $\frac{2}{(3^2)(5^2)} >=< \frac{7}{(3^3)(5^2)}$ after multiplying the inequality by $(3^2)(5^2)$ we are left with $2 < \frac{7}{3}$ ➔ B is not the answer. Compare C and D: $\frac{45}{(3^3)(5^3)} >=< \frac{7}{(3^3)(5^2)}$ after multiplying the inequality by $(3^3)(5^2)$ we are left with $\frac{45}{5} > 7 < \frac{7}{3}$ ➔ C is not the answer. Compare D and E: $\frac{45}{(3^3)(5^3)} >=< \frac{75}{(3^4)(5^5)}$ after multiplying the inequality by $(3^3)(5^3)$ we are left with $45 > \frac{75}{75} < \frac{7}{3}$ ➔ D has the greatest value.